

**Remarks**

Claim 1 has been replaced by new claim 26. The binder material of the catalyst composition is limited to materials obtained from carbonization of an organic polymer to a carbon content of at least 70 wt.%. The basis for this limitation is found at page 8, lines 6-11.

**Claim rejections – 35 USC 112**

Claims 1 and 25 have been rejected on the basis that the limitation of a side crushing strength was deemed indefinite because the unit for this property should be in force per area, i.e., lbs/mm<sup>2</sup>. Although applicant does not agree with the Examiner's comment, the issue has become moot because this limitation is no longer in the claims.

The Soled reference (US 6,162,350) provides evidence that the side crush strength is a parameter well known to those skilled in the art (see col. 20, lines 16-22), and that the proper unit is lbs./mm.

**Claim rejections – 35 USC 103(a).**

Claims 1, 4-14, and 25 have been rejected under 35 USC 103(a) as being unpatentable over JP 07-289898 ("JP '898"). As the Examiner has acknowledged, JP '898 is limited to support materials having a carbon content of equal to or less than 65 wt.%. The reference specifically teaches away from support materials comprising more than 65 wt.% carbon (see paragraph [0017]). As amended, the claims of the present patent application require a carbon

content of at least 70 wt.%. The claims further require that the binder material comprises an at least partly carbonized organic polymer.

The materials exemplified in JP '898 are peat, peat moss, and different forms of cellulose (paper, wood chips, etc.). Peat and peat moss are low-carbon forms of coal; the skilled person is instructed to keep the carbon level below 65 wt.%. Cellulose is a natural organic polymer having the general formula  $(COH_2)_n$ . Water-free cellulose has a carbon content of 40 wt.%. There is no suggestion that the cellulose should be carbonized. To the contrary, the reference teaches that drying alone is sufficient to obtain good catalytic properties (see paragraph [0049], last sentence, and paragraph [[0054]]). Drying is done under mild conditions, and preferably under inert atmosphere or under hydrogen (paragraph [0055]).

Thus, JP '898 teaches away from carbon levels above 65 wt.%, and in the case of cellulose the resulting carbon content is only 40 wt.%.

Claims 1, 3-14 and 25 have been rejected under 35 USC 103(a) as being unpatentable over Soled et al. (US 6,162,350). This rejection is based on the disclosure in Soled et al. of the use of graphite as a shaping agent. This rejection is not well taken. The Soled et al. reference makes a clear distinction between binder materials and shaping additives.

The binder materials of Soled are exemplified in col. 13, lines 44-61. These are all inorganic materials, and are all added in such a way that they become an integral part of the catalyst particles. The shaping additives are used to assist in the creation of pellets and similar forms, after the catalyst composition

has been synthesized. The present invention uses the term "binding materials" in the same way as the Soled reference uses this term, however, in Soled all binder materials are inorganic and carbon-free, whereas in the present invention the binder materials are carbon-based.

In any event, the present amendments to the claims obviate this rejection, because the claimed binding materials are now limited to those derived from organic polymers.

Claims 1, 3-14, and 25 have been rejected under 35 USC 103(a) as being unpatentable over Soled et al. (US 6,162,350) in view of Sudhakar et al. (US 5,525,211). The Examiner's position is, basically, that "it would have been obvious to one of ordinary skill at the time of [the] invention to use a carbon or graphite binder material, as taught by Sudhakar et al., in the catalyst of Soled et al., because it achieves the desired effect and meets the conditions of being a conventionally used binder for hydroprocessing catalysts".

However, these two references relate to two entirely distinct types of catalyst, and use the term "binder" in a different way, which makes it improper to combine their teachings in this manner. The Soled et al. reference is concerned exclusively with bulk catalysts, which optionally comprise a binder material. In a bulk catalyst the metal components are to provide the desired porosity, as explained in col. 8, lines 16-61. The binder may be added in the form of a solution (col. 13, lines 1-2). If a binder is used, the bulk catalyst particles maintain their morphology; the particles become embedded in the binder material (col. 14, lines 24-32).

By contrast, the Sudhakar et al. reference is concerned exclusively with supported catalysts (col. 3, lines 45-47). The supported catalysts are “prepared on MgAl<sub>2</sub>O<sub>4</sub>) … spinel supports” (col. 3, lines 61-63, emphasis added). The support is selected so as to provide a specific porosity (col. 4, lines 2-6). The support material may be formed into granules, pellets or extrudates in the presence of a binder.

The catalysts of Sudhakar et al. are prepared by impregnating the spinel support material with aqueous solutions of the metal components. This happens after the support is formed into extrudates (see examples 1-4). The impregnation is followed by drying, and by calcination in air at 500 °C.

In the bulk catalysts of Soled et al. the structure of the catalysts is provided by the metal oxide particles themselves, optionally with the aid of a binder, such as material listed at col. 13, lines 41-61. The catalyst compositions may be shaped (extruded, palletized, beaded) in the presence of a shaping additive (such as graphite). See col. 14, lines 39-44).

In the case of the supported catalysts of Sudhakar et al. the support materials may be shaped into granules, pellets, or extrudates in the presence of “binders”, such as non-acidic clay or graphite/carbon.

It will be clear to the skilled person that Sudhakar et al. uses the term “binder” in the meaning of the shaping aids of Soled et al. The combined teachings of the two references would not lead one to replace the binders of Soled et al. with the “binders” of Sudhakar et al. The combined teachings would, at most, lead one to replace the shaping additives of Soled et al. with the

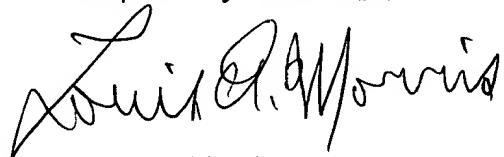
"binders" of Sudhakar et al. No new insights would result from this, because both use and exemplify well-known materials for this role.

In any event, the combination does not produce the catalysts of the present invention. The catalyst compositions of Sudhakar et al. withstand calcination in air at 500 °C for 3 hours (examples 1-4). Soled et al teaches optional calcination at 350 to 500 °C. These materials clearly do not meet the definition of "combustible binder material", which are materials that are "converted to gaseous compounds, such as carbon dioxide, in air at a temperature above about 230 °C" (see page 7, lines 27-30).

Conclusion

In view of the above remarks and amended claims submitted herewith, all grounds for rejection of the instant claims have been obviated. An early allowance of the instant claims is respectfully requested.

Respectfully submitted,



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